

REMARKS

Favorable reconsideration of this application, in view of the present amendments and in light of the following discussion, is respectfully requested.

Claims 1-2, 4-5 and 7-17 are pending. Claims 1, 4, 12 and 16-17 are amended. No new matter is introduced.

In the outstanding Office Action, Claims 1-2, 4-5, 7-9 and 12-17 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Eberbach (U.S. Patent No. 4,885,782) in view of Fujita (U.S. Patent No. 5,812,685) and Willems (U.S. Patent Application Publication No. 2002/0025047); Claim 10 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Eberbach, Fujita and Willems in further view of Packard (U.S. Patent No. 7,035,417); and Claim 11 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Eberbach, Fujita and Willems in further view of Hirade (U.S. Patent No. 7,119,267).

In reply to the rejection of Claims 1-2, 4-5, 7-9 and 12-17 as being unpatentable over Eberbach, Fujita and Willems, Claim 1 is amended to recite, *inter alia*, an audio signal processing apparatus adapted for delivering an audio signal to a speaker system that includes:

an FIR filter configured to generate the preprocessed audio signal from a filtered signal by correcting a phase shift between sound waves radiated from drive surfaces of each of the at least two drive units of the speaker system, the phase shift caused by relative physical locations of the drive surfaces of each of the at least two drive units, the FIR filter generating the preprocessed audio signal using coefficients corresponding to an overall inverse impulse response of the entire speaker system...

Thus, amended Claim 1 defines an FIR filter whose coefficients represent the inverse impulse response of the entire speaker system (i.e., the frequency dividing filter and the at least two drive units) and which corrects a phase shift between the sound generated by one of the drive units with respect to the other drive unit because of the difference in relative position of the two drive units. It is believed that no reference cited suggests or discloses this feature.

For example, as discussed in previous responses, Eberbach describes a loudspeaker driver that compensates for relative positioning of high frequency driver with respect to a low frequency driver using a cross-over circuit (28) and a delay (30).<sup>1</sup> Thus, Eberbach merely describes using a delay rather than the inverse impulse response of the loudspeaker system. The outstanding Office Action acknowledges this fact on page 3, but asserts that Fujita describes the claimed FIR filter.

Fujita describes a polyhedron speaker system that reproduces sound in a spherical pattern using an DSP (6) to implement a digital filter that corrects the distortion inherent in each of the speakers.<sup>2</sup> Specifically, Fujita describes that an FIR filter, IIR filter, or a combination thereof, is loaded into the DSP (6) to process a digital input signal with inverse correction speaker responses that correct for distortion of frequency and phase that is inherent in *each of the speaker units*.<sup>3</sup>

However, Fujita does not describe that the FIR filter loaded into the DSP (6) include coefficients corresponding to an inverse correction of the response of the entire polyhedron speaker system, as the outstanding Office Action contends. Instead, Fujita merely describes that the FIR filter corrects for the distortion inherent in each of the speaker units using the FIR filter.<sup>4</sup> In other words, what Fujita describes is that the FIR filter corrects for the distortion caused by each individual speaker, not the distortion caused by relative differences in positioning of the speakers. In fact, Fujita also describes that a delay, rather than an inverse response, is used to compensate for the positioning differences among the speakers in the polyhedron speaker system.<sup>5</sup> Conversely, amended Claim 1 recites an FIR filter that generates the preprocessed audio signal from a filter signal by correcting a phase shift between sound waves radiated from drive surfaces of each of the at least two drive units,

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<sup>1</sup> Eberbach at column 1, lines 18-45 and column 3, lines 34-45; see also Figures 2-3.

<sup>2</sup> Fujita at column 5, lines 34-58 and column 6, lines 19-37; see also Figure 4.

<sup>3</sup> Fujita at column 6, lines 26-37.

<sup>4</sup> Id.

<sup>5</sup> Fujita at column 8, lines 14-21.

where the phase shift is caused by the relative physical location of the drive surfaces of each of the at least two drive units. Therefore, Fujita fails to disclose the claimed FIR filter and does not cure the above deficiencies in Eberbach. Willems also does not cure these deficiencies as it merely described sound localization.

As first recognized by the present inventors, the frequency dividing filter, at least two drive units, FIR filter and first filter recited in amended Claim 1 synergistically combined to localize a sound image origin at arbitrary positions while eliminating distortion of the sound image due to the relative difference in position of the high-frequency speakers and the low-frequency speakers. Specifically, without the innovative compensation defined in amended Claim 1, sound from the high-frequency speakers would reach the ear of a listener before the sound from the low-frequency speakers, resulting in deterioration of the sound image because of the Haas effect. These features are not completed by the cited art.

Further, neither Eberbach nor Fujita describe sound image localization, and Willems does not describe distortion as a result of the different locations of the speakers. Thus, the combination of references proposed by the outstanding Office Action could only have resulted from impermissible hindsight reconstruction based upon a reading of Applicants' disclosure. However, such a combination is improper and can not form the basis of a *prima facie* case of obviousness under 35 U.S.C. § 103(a). Therefore, for the above reasons it is believed that Claim 1, as amended, is in condition for allowance together with its corresponding dependent claims.

Moreover, as Claims 4, 16 and 17 recite features substantially similar to those recited in amended Claim 1, Claims 4, 16 and 17 are also believed to be in condition for allowance, together with any claim depending therefrom, for substantially similar reasons. Accordingly, it is respectfully requested that the rejection of Claims 1-2, 4-5, 7-9 and 12-17 under 35 U.S.C. § 103(a) be withdrawn.

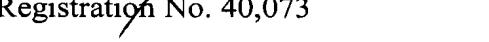
As all of the rejection of record rely upon Eberbach and Fujita for describing the above-distinguished features, and the above-distinguished features are not disclosed or suggested by Eberbach or Fujita, alone, or in combination with any other art of record, it is respectfully submitted that a *prima facie* case of obviousness has not been presented. Accordingly, it is respectfully requested that the rejection of Claims 10-11 under 35 U.S.C. § 103(a) be withdrawn.

For the reasons discussed above, no further issues are believed to be outstanding in the present application, and the present application is believed to be in condition for formal allowance. Therefore, a Notice of Allowance for Claims 1-2, 4-5 and 7-17 is earnestly solicited.

Respectfully submitted,

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